

What is Claimed is:

1. A chip shaped electronic device comprising an element body including zinc oxide material layers and
5 internal electrode layers, wherein

when assuming a minimum distance from an outermost side of said internal electrode layer in the stacking direction to a surface of said element body is l and measuring an ion intensity ratio of an alkali metal
10 (A) and zinc (Zn), (A/Zn) , in a range from the surface of said element body to a depth of $(0.9 \times l)$ by a secondary ion mass spectrometry, $0.001 \leq (A/Zn) \leq 500$.

2. A chip shaped electronic device comprising an
15 element body including zinc oxide material layers and internal electrode layers, wherein

when assuming a minimum distance from an outermost side of said internal electrode layer in the stacking direction to a surface of said element body is l and measuring an ion intensity ratio of Li and Zn,
20 (Li/Zn) , in a range from the surface of said element body to a depth of $(0.9 \times l)$ by a secondary ion mass spectrometry, $0.001 \leq (Li/Zn) \leq 500$.

25 3. A chip shaped electronic device comprising an

element body including zinc oxide material layers and internal electrode layers, wherein

when assuming a minimum distance from an outermost side of said internal electrode layer in the stacking direction to a surface of said element body is 1
5 and measuring an ion intensity ratio of Na and Zn, (Na/Zn), in a range from the surface of said element body to a depth of (0.9×1) by a secondary ion mass spectrometry, $0.001 \leq (\text{Na/Zn}) \leq 100$.

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4. A chip shaped electronic device comprising an element body including zinc oxide material layers and internal electrode layers, wherein

when assuming a minimum distance from an
15 outermost side of said internal electrode layer in the stacking direction to a surface of said element body is 1 and measuring an ion intensity ratio of K and Zn, (K/Zn), in a range from the surface of said element body to a depth of (0.9×1) by a secondary ion mass spectrometry,
20 $0.001 \leq (\text{K/Zn}) \leq 100$.

5. A chip shaped electronic device comprising an element body including zinc oxide material layers and internal electrode layers, wherein

25 when assuming a minimum distance from an

outermost side of said internal electrode layer in the stacking direction to a surface of said element body is l and measuring an ion intensity ratio of Rb and Zn, (Rb/Zn) , in a range from the surface of said element body to a depth of $(0.9 \times l)$ by a secondary ion mass spectrometry, $0.001 \leq (\text{Rb}/\text{Zn}) \leq 100$.

6. A chip shaped electronic device comprising an element body including zinc oxide material layers and internal electrode layers, wherein

when assuming a minimum distance from an outermost side of said internal electrode layer in the stacking direction to a surface of said element body is l and measuring an ion intensity ratio of Cs and Zn, (Cs/Zn) , in a range from the surface of said element body to a depth of $(0.9 \times l)$ by a secondary ion mass spectrometry, $0.001 \leq (\text{Cs}/\text{Zn}) \leq 100$.

7. A chip shaped electronic device comprising an element body including zinc oxide material layers and internal electrode layers, wherein

when measuring an ion intensity ratio of an alkali metal (A) and zinc (Zn), (A/Zn) , in a range from the surface of said element body to a depth of $100 \mu\text{m}$ by a secondary ion mass spectrometry, it is $0.001 \leq (\text{A}/\text{Zn}) \leq$

500.

8. A chip shaped electronic device comprising an element body including zinc oxide material layers and
5 internal electrode layers, wherein

when measuring an ion intensity ratio of Li and Zn, (Li/Zn) , in a range from the surface of said element body to a depth of 100 μm by a secondary ion mass spectrometry, it is $0.001 \leq (\text{Li}/\text{Zn}) \leq 500$.

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9. The chip shaped electronic device as set forth in claim 8, wherein said ion intensity ratio is $0.01 \leq (\text{Li}/\text{Zn}) \leq 500$.

15 10. A chip shaped electronic device comprising an element body including zinc oxide material layers and internal electrode layers, wherein

when measuring an ion intensity ratio of Na and Zn, (Na/Zn) , in a range from the surface of said
20 element body to a depth of 100 μm by a secondary ion mass spectrometry, it is $0.001 \leq (\text{Na}/\text{Zn}) \leq 100$.

11. A chip shaped electronic device comprising an element body including zinc oxide material layers and
25 internal electrode layers, wherein

when measuring an ion intensity ratio of K and Zn, (K/Zn) , in a range from the surface of said element body to a depth of 100 μm by a secondary ion mass spectrometry, it is $0.001 \leq (K/Zn) \leq 100$.

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12. A chip shaped electronic device comprising an element body including zinc oxide material layers and internal electrode layers, wherein

when measuring an ion intensity ratio of Rb and Zn, (Rb/Zn) , in a range from the surface of said element body to a depth of 100 μm by a secondary ion mass spectrometry, it is $0.01 \leq (Rb/Zn) \leq 100$.

13. A chip shaped electronic device comprising an element body including zinc oxide material layers and internal electrode layers, wherein

when measuring an ion intensity ratio of Cs and Zn, (Cs/Zn) , in a range from the surface of said element body to a depth of 100 μm by a secondary ion mass spectrometry, it is $0.1 \leq (Cs/Zn) \leq 100$.

14. A chip shaped electronic device comprising:
an element body including zinc oxide material layers and internal electrode layers and having a size of 0.6 mm or less \times 0.3 mm or less \times a thickness of 0.3 mm

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or less; and

a pair of terminal electrodes formed on an outer surface of the element body, wherein a distance between facing end portions on the same plane (a gap
5 between terminals) is 50 μm or more;

wherein when assuming a minimum distance from an outermost side of said internal electrode layer in the stacking direction to a surface of said element body is 1 and measuring an ion intensity ratio of Li and Zn,
10 (Li/Zn), in a range from the surface of said element body to a depth of (0.9×1) by a secondary ion mass spectrometry (SIMS), it is $0.001 \leq (\text{Li/Zn}) \leq 500$.

15. The chip shaped electronic device as set
15 forth in claim 14, wherein said ion intensity ratio is $0.01 \leq (\text{Li/Zn}) \leq 500$.

16. A chip shaped electronic device comprising:
an element body including zinc oxide material
20 layers and internal electrode layers and having a size of $0.6 \text{ mm or less} \times 0.3 \text{ mm or less} \times$ a thickness of 0.3 mm or less; and

a pair of terminal electrodes formed on an outer surface of the element body, wherein a distance
25 between facing end portions on the same plane is 50 μm or

more;

wherein when assuming a minimum distance from an outermost side of said internal electrode layer in the stacking direction to a surface of said element body is l and measuring an ion intensity ratio of Na and Zn, (Na/Zn), in a range from the surface of said element body to a depth of $(0.9 \times l)$ by a secondary ion mass spectrometry, it is $0.001 \leq (\text{Na/Zn}) \leq 100$.

10 17. A chip shaped electronic device comprising:

an element body including zinc oxide material layers and internal electrode layers and having a size of $0.6 \text{ mm or less} \times 0.3 \text{ mm or less} \times$ a thickness of 0.3 mm or less ; and

15 a pair of terminal electrodes formed on an outer surface of the element body, wherein a distance between facing end portions on the same plane is $50 \text{ } \mu\text{m}$ or more;

wherein when assuming a minimum distance from an outermost side of said internal electrode layer in the stacking direction to a surface of said element body is l and measuring an ion intensity ratio of K and Zn, (K/Zn), in a range from the surface of said element body to a depth of $(0.9 \times l)$ by a secondary ion mass spectrometry, it is $0.001 \leq (\text{K/Zn}) \leq 100$.

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18. A chip shaped electronic device comprising:

an element body including zinc oxide material layers and internal electrode layers and having a size of
5 0.6 mm or less \times 0.3 mm or less \times a thickness of 0.3 mm or less; and

a pair of terminal electrodes formed on an outer surface of the element body, wherein a distance between facing end portions on the same plane is 50 μ m or
10 more;

wherein when assuming a minimum distance from an outermost side of said internal electrode layer in the stacking direction to a surface of said element body is 1 and measuring an ion intensity ratio of Rb and Zn,
15 (Rb/Zn), in a range from the surface of said element body to a depth of (0.9×1) by a secondary ion mass spectrometry, it is $0.001 \leq (\text{Rb/Zn}) \leq 100$.

19. A chip shaped electronic device comprising:

20 an element body including zinc oxide material layers and internal electrode layers and having a size of 0.6 mm or less \times 0.3 mm or less \times a thickness of 0.3 mm or less; and

a pair of terminal electrodes formed on an
25 outer surface of the element body, wherein a distance

between facing end portions on the same plane is 50 μm or more;

wherein when assuming a minimum distance from an outermost side of said internal electrode layer in the stacking direction to a surface of said element body is 1 and measuring an ion intensity ratio of Cs and Zn, (Cs/Zn), in a range from the surface of said element body to a depth of (0.9×1) by a secondary ion mass spectrometry, it is $0.001 \leq (\text{Cs/Zn}) \leq 100$.

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20. A chip shaped electronic device comprising:
an element body including zinc oxide material layers and internal electrode layers and having a size of 0.6 mm or less \times 0.3 mm or less \times a thickness of 0.3 mm or less; and

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a pair of terminal electrodes formed on an outer surface of the element body, wherein a distance between facing end portions on the same plane is 50 μm or more;

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wherein when assuming a minimum distance from an outermost side of said internal electrode layer in the stacking direction to a surface of said element body is 1 and measuring an ion intensity ratio of an alkali metal (A) and zinc (Zn), (A/Zn), in a range from the surface of said element body to a depth of (0.9×1) by a secondary

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ion mass spectrometry, it is $0.001 \leq (A/Zn) \leq 500$.

21. The chip shaped electronic device as set forth in any one of claims 1 to 20, wherein said element
5 body has the configuration of alternately stacking zinc oxide voltage nonlinear resistor layers and internal electrode layers, and said chip shaped electronic device is a multilayer type chip varistor.

10 22. A method of producing a chip shaped electronic device comprising an element body including zinc oxide material layers and internal electrode layers, and a pair of terminal electrodes formed on an outer surface of the element body, including the steps of:

15 forming said element body;

diffusing an alkali metal (A) from a surface of said element body to inside the element body; and

after that, forming on the outer surface of said element body said pair of terminal electrodes

20 connected to said internal electrode layers;

wherein:

the alkali metal is diffused under a condition of attaining $0.001 \leq (A/Zn) \leq 500$ when assuming a minimum distance from an outermost layer side of said
25 internal electrode layers in the stacking direction to

the surface of said element body is 1 at the time of
diffusing said alkali metal and measuring an ion
intensity ratio of the alkali metal (A) and zinc (Zn),
(A/Zn), in a range from the surface of said element body
5 to a depth of (0.9×1) by a secondary ion mass
spectrometry.

23. A method of producing a chip shaped
electronic device comprising an element body including
10 zinc oxide material layers and internal electrode layers,
and a pair of terminal electrodes formed on an outer
surface of the element body, including the steps of:

forming said element body;

forming on the outer surface of said element
15 body terminal electrodes connected to said internal
electrode layers; and

after that, diffusing an alkali metal (A)
from a surface of said element body to inside the element
body;

20 wherein:

the alkali metal is diffused under a
condition of attaining $0.001 \leq (A/Zn) \leq 500$ when assuming
a minimum distance from an outermost layer side of said
internal electrode layers in the stacking direction to
25 the surface of said element body is 1 at the time of

diffusing said alkali metal and measuring an ion
intensity ratio of the alkali metal (A) and zinc (Zn),
(A/Zn), in a range from the surface of said element body
to a depth of (0.9×1) by a secondary ion mass
5 spectrometry.

24. A method of producing a chip shaped
electronic device comprising an element body including
zinc oxide material layers and internal electrode layers,
10 including the steps of:

forming said element body;

diffusing an alkali metal (A) from a surface
of said element body to inside the element body; and

after that, forming on the outer surface of
15 said element body terminal electrodes connected to said
internal electrode layers; and

wherein:

the alkali metal is diffused under a
condition of attaining $0.001 \leq (A/Zn) \leq 500$ when
20 measuring an ion intensity ratio of the alkali metal (A)
and zinc (Zn), (A/Zn), in a range from the surface of
said element body to a depth of 100 μm by a secondary ion
mass spectrometry.

25 25. A method of producing a chip shaped

electronic device comprising an element body including zinc oxide material layers and internal electrode layers, including the steps of:

forming said element body;

5 forming on the outer surface of said element body terminal electrodes connected to said internal electrode layers; and

after that, diffusing an alkali metal (A) from a surface of said element body to inside the element
10 body;

wherein:

the alkali metal is diffused under a condition of attaining $0.001 \leq (A/Zn) \leq 500$ when measuring an ion intensity ratio of the alkali metal (A)
15 and zinc (Zn), (A/Zn) , in a range from the surface of said element body to a depth of 100 μm by a secondary ion mass spectrometry.

26. A method of producing a chip shaped
20 electronic device comprising:

an element body including zinc oxide material layers and internal electrode layers and having a size of 0.6 mm or less \times 0.3 mm or less \times a thickness of 0.3 mm or less; and

25 a pair of terminal electrodes formed on an

outer surface of the element body, wherein a distance between facing end portions on the same plane is 50 μm or more; including the steps of:

forming said element body;

5 diffusing an alkali metal (A) from a surface of said element body to inside the element body; and

after that, forming on the outer surface of said element body said pair of terminal electrodes connected to said internal electrode layers;

10 wherein:

the alkali metal is diffused under a condition of attaining $0.001 \leq (A/Zn) \leq 500$ when assuming a minimum distance from an outermost layer side of said internal electrode layers in the stacking direction to the surface of said element body is 1 at the time of diffusing said alkali metal and measuring an ion intensity ratio of the alkali metal (A) and zinc (Zn), (A/Zn), in a range from the surface of said element body to a depth of (0.9×1) by a secondary ion mass spectrometry.

15 the surface of said element body is 1 at the time of
diffusing said alkali metal and measuring an ion
intensity ratio of the alkali metal (A) and zinc (Zn),
(A/Zn), in a range from the surface of said element body
to a depth of (0.9×1) by a secondary ion mass
20 spectrometry.

27. A method of producing a chip shaped electronic device comprising:

an element body including zinc oxide material layers and internal electrode layers and having a size of

25 layers and internal electrode layers and having a size of

0.6 mm or less \times 0.3 mm or less \times a thickness of 0.3 mm or less; and

a pair of terminal electrodes formed on an outer surface of the element body, wherein a distance
5 between facing end portions on the same plane is 50 μ m or more; including the steps of:

forming said element body;

forming on the outer surface of said element body said pair of terminal electrodes connected to said
10 internal electrode layers; and

after that, diffusing an alkali metal (A) from a surface of said element body to inside the element body;

wherein:

15 the alkali metal is diffused under a condition of attaining $0.001 \leq (A/Zn) \leq 500$ when assuming a minimum distance from an outermost layer side of said internal electrode layers in the stacking direction to the surface of said element body is 1 at the time of
20 diffusing said alkali metal and measuring an ion intensity ratio of the alkali metal (A) and zinc (Zn), (A/Zn) , in a range from the surface of said element body to a depth of (0.9×1) by a secondary ion mass spectrometry.

28. The chip shaped electronic device as set forth in any one of claims 22 to 27, wherein said alkali metal is at least one of Li, Na, K, Rb and Cs.

5 29. The chip shaped electronic device as set forth in any one of claims 22 to 27, wherein at the time of diffusing said alkali metal, said element body is subjected to heat treatment at a temperature of 700 to 1000°C in a state of being applied with powder of an
10 alkali metal compound, and at least one of an application amount of said powder to the surface of said element body, a heat treatment temperature and a heat treatment time is controlled.

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